REMARKS

Claims 1-6, as amended and new claims 17-30 are presented herewith for the Examiner's review and consideration. Claims 7-16 have been cancelled without prejudice to applicants' rights to file a divisional application for those claims.

The claims were amended to further define the invention. In particular, claim 1 was amended to recite that the invention is an agricultural soil treating solution, as supported by paragraph 17 of the published application. Claim 1 was also amended to recite that the silicate and siliconate are present in a molar ratio of at least 0.5:1 to 10:1, as previously recited in claim 2, and that these compounds are present in amount effective to increase hydrophobicity of the soil after the solution is applied thereto due to the formation of silicic acid or silica gel therein in order to reduce water evaporation from the treated soil, as supported by paragraph 12 of the published application. The molar ratio of claim 2 was amended to be consistent with that of claim 1, and is supported by the recitation of claim 3. Claims 2-4 were also amended to be consistent with claim 1. Claim 6 was also amended to correct a typographical error where the word "agent" was previously presented as "principle." No new matter has been introduced by these claim changes.

The new claims are directed to preferred embodiments of the invention. Claim 17 recites that both a coloring agent and an agrochemical principle are present, as supported by claim 6. Claims 18 and 26 recite the amount of solution that is applied to the soil, as supported by paragraph 17 of the published application. Claims 19 and 27 recite certain components of the soil as well as the advantages obtainable with the present solution compared to the use of treating solutions that only contain the siliconate compound, as supported by paragraphs 6 and13 of the published application. Claims 20 and 28 recite the solution of claim 6 but with the preamble phrases "consisting essentially of" and "consisting of" to eliminate other non-essential ingredients from the solutions of these claims. Claims 21-25 and 29-30 are repeated versions of claim 2-6 and are supported by those claims. Thus, no new matter will be introduced by the addition of these claims to the application.

Applicants confirm their election of the Group I claims for examination in this application. Since all current claims are directed to agricultural soil treating compositions, they should be examined together at this time.

In response to the Examiner's observations about the prior art, applicants submit herewith a copy of European patent application 889,109 with fee authorization. That

application is not material to the patentability of the present claims for the reasons and explanations set forth in paragraphs 8, 12 and 13 of the published application.

The disclosure and claim 6 were objected to due to the language "a color principle." Applicants have now amended the specification at paragraph 5 and claim 6 to properly refer to this component as a coloring agent, as supported by paragraph 15 of the specification, to render moot this objection.

Claim 1 was rejected for anticipation over 6 different references as noted on page 4 of the office action. In response, applicants have amended claim 1 to incorporate the molar ratio that was previously recited in claim 2, a claim that was not rejected for anticipation over these references. While claims 5 and 6 were rejected for anticipation over some of these references, this amendment also obviates those rejections. Accordingly, all anticipation rejections have been overcome.

Claim 5 was rejected as being obvious over JP 51-126,986 while claims 2-5 were rejected as being obvious over Brown US patent 2,905,562. These rejections are now inapplicable to the presently amended claims for the reasons that follow.

The present claims are specifically directed to a preferred embodiment of the invention. This is an agricultural soil treating solution comprising an aqueous mixture of a C1 to C4 alkyl siliconate compound and a silicate compound. The compounds are present at a molar ratio of silicate compound to siliconate compound of 0.5/1 to 10/1. They are also present in an amount effective to increase hydrophobicity of the soil after the solution is applied thereto due to the formation of silicic acid or silica gel therein in order to reduce water evaporation from the treated soil. The present amendments to claim 1 now exclude solutions for treating other substrates and instead are focused on the preferred solutions for use in treating soil for assisting in the growth of plants or crops.

This is an important invention since it enables increased quantities of crops to be prepared using the same amount of water that has been used in the past, or it can achieve the same level pf crop production using much less water than in the past. This solution provides the unexpected advantage of enabling crop production to successfully be accomplished in arid or hot climates, as it can conserve or reduce the demand for water in any crop-growing situation. While it is known that the application of hydrophobing agents on an arid soil permits a substantial economy of water, because the treated surface presents an efficient barrier against the evaporation of irrigation water, the present solution provides improvements both as to how much water is needed to apply such solutions as well as to the

concentration of the siliconates in the solution. It surprisingly has been found that the use of the presently claimed mixtures of the silicate and siliconate compounds induce, for the same depth of hydrophobing treatment, a protection against evaporation that is increased over that of the hydrophobic effect induced by siliconates alone. For the most preferred mixtures, the increase is more than double that of the siliconate alone. This phenomenon is explained by the fact that silicate, exposed to the ambient atmosphere, transforms into silicic acid (silica gel) which contributes markedly by steric hindrance, on co-application with methylsiliconate, to the desired effect of reducing evaporation. Furthermore, the substitution of a significant part of the costly siliconate by silicate permits a reduction of the amount of water needed for application by a factor of 2 and the quantity of the hydrophobing agent needed by a factor of 4, for a treatment offering the same evaporation protection. The cost of the treatment is thus reduced by a factor of about 3 to 4. In addition, the treatment is facilitated by the unexpected reduction in the volume of water needed for application.

The cited references do not disclose this invention. The JP reference discloses an adhesive water-repellant that is applied to the surface of a material such as gypsum board, molded calcium silicate or the like. This is done to improve the adhesive property of the material to cement mortar or castable refractories and to improve the peeling strength of the material. There is no disclosure of an agricultural soil treating solution as claimed in the present invention. While the JP reference does mention that the adhesive imparts a water-repellant property to the surface of the material to which it is applied, this is the opposite of what he present invention does. The present solution is applied to soil to prevent water evaporation from the soil. Thus, the water is retained in the soil where it can be absorbed by plants to assist plant growth. The solution is particularly useful in arid climates, where the hot environment can cause significant amounts of water to evaporate from the soil, thus requiring additional water to be applied so that the plants receive sufficient moisture for growth. A commercial product that embodies the presently claimed solution is called GUILSPARE, and a description of this solution and its use can be found in the attached pages. These show that the presently claimed solution is not obvious from the cited JP reference. The adhesive of the JP reference is used to form a water repellant, adhesive coating or treatment on the surface of gypsum board or like materials. There is no disclosure of an agricultural soil treating solution in that reference, nor is there any suggestion of the benefits that can be obtained from the use of such as solution. Thus, the JP reference is

irrelevant to the presently claimed invention and all rejections based on that reference should be withdrawn.

Brown discloses a process for rendering masonry water repellant. He treats the surfaces of such masonry with a mixture of an aqueous solution of an alkali metal silicate and an alkali metal siliconate. Like the JP reference, Brown is concerned with treating the surface of a substrate, in this case masonry, with a mixture that renders it water repellant. There is no disclosure of an agricultural soil treating solution in that reference, nor is there any suggestion of the benefits that can be obtained from the use of such as solution. Thus, Brown is equally irrelevant to the presently claimed invention and all rejections based on that reference should also be withdrawn.

Certain other claims recite features that are not present at all in either the JP reference or the Brown patent. In particular, claims 17 and 20-30 recite that the solution includes an agricultural principle. As explained in the specification, this component is one that has a beneficial effect on an agricultural crop. Preferred agrochemical principles are chosen from the group constituted by a herbicide, an insecticide, a pesticide, an anti-fungal agent, a repulsive agent or mixtures thereof. This is an advantageous additive for the present solutions as those solutions are for agricultural soil treatment. There would be no need for such a component in the water-repellant compositions of the JP reference or the Brown patent, since there is no attempt to grow plants on the surfaces that are treated with those compositions. Accordingly, these claims are further patentable over these references due to the recitation of the agricultural principle component.

In view of the above, the present claims and entire application are now in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree that all claims are patentable, then a personal or telephonic interview is respectfully requested to discuss any remaining issues in order to expedite the eventual allowance of this application.

Respectfully submitted,

Date: 5/23/03

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3 PRODUCT

3.1 INTRODUCTION TO GUILSPARE

Guilspare is the first product to provide solid evidence that it can substantially reduce the quantity of irrigation water needed to grow crops in arid regions, especially on sandy soils. It has also shown that it can significantly increase crop yields and reduce soil salinity and weed growth. Invented at Nestlé's Research Centre near Lausanne, Switzerland, Guilspare has been developed by Guilford and successfully field-tested by three recognised scientific institutions: Sultan Kaboos University in Oman, I.R.N.A.S.E. (Instituto de Recursos Naturales y Agrobiologia) in Spain and the University of California, Davis. The excellent test results obtained in Spain led IRNASE to write a paper "Evaluating the effectiveness of a hydrophobic polymer for conserving water and reducing weed infection in a sandy loam soil" which was published by *Agricultural Water Management* in 2001.

Guilspare has also been evaluated by the California Food and Agriculture Department (CFAD) which is the recognised authority for registering products for agricultural use in the whole of the United States. This successful evaluation represents a major breakthrough as it implicitly confirms the safety of the product. Th US Environment Protection Agency requires no further trials on environmental hazards since the safety of all the components of Guilspare has already been demonstrated.

Guilspare offers a **totally new approach** to water conservation on agricultural soils. Water savers previously available were mostly crystals or sponges to be placed in the soil. They absorbed and retained water, but eventually competed for it with the soil and plant roots.

The Guilspare process involves spraying the soil surface with a liquid that can easily be applied either by conventional agricultural liquid-dispensing machinery or even by hand-held watering cans. It can reach any desired depth by adjusting the volume of liquid per m^2 applied on the soil surface.

When applied to soil particles or porous surfaces, Guilspare renders the particles individually water-repellent. However, the treated soil or surface remains permeable to air and gases: the soil "breathes" and its "hygiene" is integrally maintained. On agricultural soil, this property reduces **loss of soil water** by **evaporation** (surface treatment) and also by **infiltration** (sub-surface treatment). It neutralises capillary forces in the soil (see figures A and B on page 11), which are integral parts of the mechanism of water diffusion and evaporative loss in soils (or in any other porous material).

The **quantities** of Guilspare required depend on the nature of the soil. A fine sandy soil needs about 90 liters/ha which is the amount we have used for our calculations. However, evaporation protection on heavy soils or reclamation of saline soils will require more.

On a bare sandy soil, a 5mm layer reduces evaporation by about 80%. On planted surfaces, water is lost through three mechanisms: evaporation, infiltration and transpiration through the plant's leaves. Field tests suggest that the amount of **water saved** by the use of Guilspare will vary between 25% and 50%, depending on the nature of the substructure, the crop, the planting season and the type of application.

3.2 PRODUCT INFORMATION

3.2.1 WHAT EXACTLY IS GUILSPARE?

Guilspare is a solvent-free, water-based preparation containing a reactive organo-silicon compound as well as functional additives. It creates a hydrophobic barrier on individual soil particles, neutralising capillary forces and thus preventing evaporation of water.

Characteristics: Guilspare is an aqueous solution of an activ compound. It comes as a clear, slightly turbid liquid. The colour of the liquid is light green when the active compound is intact, yellowish when the activ compound is slightly degraded, red wh n it is no longer active. The dry matter cont nt is about 48% by weight

and the activ compound about 28% by weight. Density at 25° is 1,34. The pH is around 14. Th solvent used is normal water.

Product features:

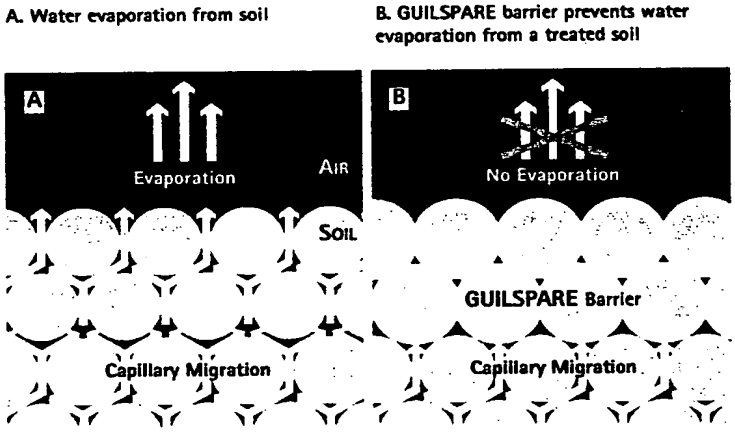
- Guilspare reacts with air to form an active precipitate;
- Dilution with very hard water gives an inactive precipitate;
- It is a highly alkaline product: avoid contact with Al, Cu, Sn, Zn or their alloys.

Storage: In a temperature range of –20°C to +30°C, Guilspare is stable for 24 months in unopened original containers.

3.2.2 How does Guilspare work?

Guilspare works by coating a depth of individual soil particles with a molecular layer of a water-repellent silica-based polymer. These particles neutralise capillary forces and prevent water from migrating to the surface, which largely prevents its evaporation. The depth of treatment (5mm - 30mm) depends on the degree and duration of evaporation protection that is needed.

The diagram below shows one proven advantage of Guilspare and the scientific reason why it works :



3.2.3 Technical effects of Guilspare

a. Soil water content:

In cases of irrigation deficit, precise measurements show that the soil water content in treated areas is 34-53% higher than in non-treated areas. Unlike conventional irrigation with "pulsing strategy", plants suffer *less lack of oxygen* in the wetting phase and *less hydric stress* in the drying phase in the rooting zone.

b. Absence of negative effects:

There is no human toxicity as long as precautions are taken which are normal in the application of any agricultural chemical. Guilspare presents no known hazard to the environment, plants, microorganisms or animals. It cannot pollute the water table since it binds strongly to soil particles and is not washed off by irrigation wat r. In cas of spills, the soil can be cleaned using lime. It slowly degrades under UV light to giv silica, the major component of soil. It does not corrode steel or plastic.

c. Desalinisation:

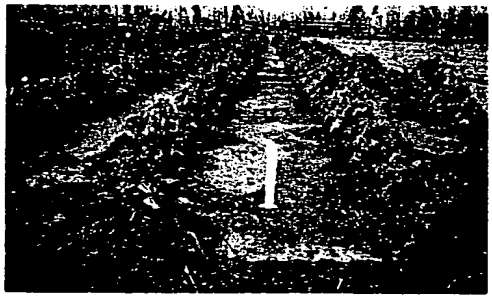
Surface treatm nt with Guilspare washes out the salt of the rooting zone towards the lower soil. This allows irrigation with moderately saline water (450 – 2000 ppm). A sub-surface treatment with Guilspare forms a barrier that prevents migration of salinity from highly saline soils into "clean" soil layers placed above.

d. Reduction of weeds:

Since the Guilspare treatment results in a dry soil surface, airborne weed seeds literally dry out after germination. Guilspare is *not* a herbicide, but a physical weed growth inhibitor or herbistatic: the protection is purely physical. However, it can be used in combination with herbicides on already weed-infested soils.

. Greater crop yields:

The Guilspare treatment also makes plants grow bigger and stronger, and remain green later in the season. The reason is that Guilspare improves the assimilation of carbon dioxide in the later crop stages. And the effect is long lasting – one treatment can serve for two or more growing seasons if there is no tillage in between.



Without .....

and with Guilspare

The photographs below show two potential application methods:

3.2.4 BENEFITS

Guilspare provides the following benefits to farmers and governments.

1. The principal benefits to FARMERS are:

   - Less water required for same crop yield (up to 50% water saving)
     or
   - More crop yield from same quantity of water (up to 30% increase in yield) and therefore substantially greater profitability (up to 100%)
     or
   - Less water for greater crop yields plus substantially greater profitability (up to 30% water saving and up to 15% increase in yield)

2. Further benefits to FARMERS

   - Less need for manual weeding
   - Crop precocity
   - Planting out of season is made possible
   - Cost efficiency
   - Ease of use
   - Versatility

3. The benefits to GOVERNMENTS include:

   - Drastic reduction in irrigation water needs
   - Increase in usable agricultural land
   - More water for domestic and industrial use
   - The basis for a focused water policy

3.2.5 GUILSPARE ATTRIBUTES & APPLICABILITY

Water saving:
- By treating bare fields for seasonal crops
- By treating soils in orchards and plantations

Controlling soil salinity:
- By changing the balance between evaporation and infiltration, particularly desirable in coastal plantations or regions where the water table is just below the surface.

Allowing new growth:
- By controlling both infiltration and evaporation
- Replanting trees on highly saline soils
- Reclaiming abandoned soils.

3.2.6 DEMONSTRATION OF THE PROPOSED BENEFITS

1. Irrigation cost savings to obtain the same crop yield

The generally accepted formula to calculat annual water loss was used by our scientists to estimate Average Water Loss in California. They found an averag of 3000 m^3 per hectare is lost annually by evaporation. If we consider that the estimated cost of irrigation water is CHF 0,37/m^3 (in many regions it is much higher), the annual saving in agricultural watering costs would be: 3000 x 0,37 = CHF 1'110 per hectare. Against that, if the average cost of using Guilspare is approx. CHF 10 per litre and about 90 litres are needed per ha, the cost

of Guilspare for the farmer would be CHF 900. This would result in a total cost saving of CHF 1'110 minus CHF 900 = CHF 210 per hectare.

Cost savings to farmers also depend on the xtent to which governments subsidize irrigation wat r. This varies from country to country. Crop yields show an increased efficiency of water use, so **farmers with water quotas can plant greater surfaces with the same amount of water.**

2. A Higher Crop Yield for Identical irrigation Costs

Trials have shown that using the same quantity of irrigation water on Guilspare -treated land than on normally irrigated land, **a farmer will obtain a 30% higher crop yield.** Since irrigation costs remain unchanged except for the cost of Guilspare, the higher crop yield due to Guilspare can actually **increase the profitability for th farmer by over 50%.**

A study using data provided by the University of California on the production of fresh tomatoes in California demonstrates that using Guilspare enables farmers to produce 450 more 25lb cartons per acre, a yield increase of 28%. Furthermore, this greater crop yield provides a profit per acre of $ 3,020, a **100%** increase!